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ABSTRACT

The goal of the present study was to investigate the relation between sex, social class as indexed by parental education level, and performance on three different types of cognitive tasks among two year old children. It was expected that social class would be related positively to superior performance on all the tasks for girls but unrelated for boys. The subjects for this study were 48 white children aged 27 months. A trained woman administered the first two tasks to each child. These were an Embedded Figures Task (EFT) and a two choice discrimination task. The third task, vocabulary recognition and vocabulary training, was administered during a home visit made within a week after the administration of the other tasks. The findings clearly support the hypothesis that parental education is related to performance on cognitive tasks among two year old girls but not among two year old boys. The possible reasons for this are: (1) girls may be biologically more homogeneous than boys due to girls' general developmental maturity relative to boys, and (2) social class has a stronger influence on the way mothers treat their daughters than on the way they treat their sons. (KJ)

# Social Class, Sex Differences and Performance on Cognitive Tasks Among Two-Year-Old Children[1]

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Social class and sex differences in the overt behavior and problem-solving strategies of preschool and school age children have been investigated and debated for many years. There are intriguing questions concerning the origins and early manifestations of these differences and many have wondered how early these differences can be detected.

The acceleration of girls over boys in physiological and physical development is well documented (Anastasi, 1958; Bayley, 1950). The developmental acceleration of girls also has been noted in intellectual spheres. During childhood, girls are advanced relative to boys in all aspects of language: age of onset, vocabulary size, number of phoneme types, etc. (Irwin & Chen 1946; Maccoby, 1966; McCarthy, 1930). In recent years, evidence has been accumulating to indicate that certain experiential factors affect girls more than boys. Bayley (1966) reported typically higher correlations between parental education and indexes of cognitive abilities for girls than for boys. Likewise, Honzik (1963) noted an increasingly positive correlation between the child's IQ and the parents' education with age, the girls' correlations becoming statistically significant around the age of three years, while boys' correlations were not significant until the age of five years. The inference is that experiences associated with parental education are affecting the girls more and earlier than the boys.

The goal of the present study was to investigate the relation between sex, social class as indexed by parental education level, and performance on three different types of cognitive tasks among two-year-old children. It was expected that social class would be related positively to superior performance on all of the tasks for girls but unrelated for boys.

## Method

### Subjects

The Ss for this study were 48 white children, 24 boys and 24 girls, aged 27 mo. who were recruited originally by advertisements in one of the local newspapers as part of an extensive longitudinal study being conducted by Jerome Kagan. The children were seen as close to 27 months from their date of birth as possible and within 14 days. With the exception of one child, who was accompanied by her older sister (the child's chief caretaker because of the mother's paralytic condition), all children came to the laboratory with their mothers. Social class was indexed by mean parental education level using the following metric:

6 = post college

5 = college degree

4 = part college

3 = high school diploma

2 = 9th grade completed

1 = 9th grade not completed

Children from all educational levels were represented in the sample.

### Procedure

A trained woman E administered the first two tasks in a large playroom which had one-way mirrors. The child had become accustomed to the room by playing with toys during a 30-min. play session. The mother was always present.

1. Embedded Figures Task (EFT). The E presented the child with a picture of a girl and taught him to touch the figure. Next, while keeping this model within the child's view, she presented him with a series of backgrounds with the figure embedded in them. The child's task was to find and touch the figure. Following the initial learning, E showed the child six sets of embedded figures, each

consisting of a model and three embeddings of the model. The first three sets were relatively easy discrimination tasks consisting of a dog, horse, and bird in backgrounds containing a number of colored figures that looked progressively more like the model as the difficulty increased. The final three sets were schematic drawings of a cat, car, and flower embedded in black and white line backgrounds. If possible, at least one response to each embedding was obtained. Only two children failed to complete at least the first four sets. The number of errors and the accuracy of each response was recorded on an Esterline Angus Event Recorder by an O behind the one-way mirrors.

2. Two-choice discrimination task. E told the child they were going to play a game with candy (M & M chocolate candy). An apparatus which had two cups in the front below two white plastic encasements was used. Each encasement contained both a red and yellow light which were invisible unless turned on. E controlled the lighting and could turn on any single light or any combination of lights. Each time the child touched the yellow light first, he was rewarded with an M & M which was delivered in the cup below the correct light. Once E felt confident that the child had learned the discrimination, she used a fixed schedule for alternating stimuli, in which the most probable chance score would be 50% correct (Gellermann, 1933). This schedule was continued until the child had five consecutively correct trials or had stopped playing the game. Each response was recorded on the Esterline Angus Event Recorder by the O. The percentage of errors was calculated for each child. Recording difficulties caused the elimination of five children.

3. Vocabulary recognition and vocabulary naming. Within one wk. of the time of the laboratory session, a second trained woman E made a home visit. She administered a vocabulary recognition and a vocabulary naming test. The vocabualry recognition test was composed of 22 items in which the child had to choose among three alternatives. She presented the child with three colored pictures, each on a

6 x 3 1/2 in. laminated card, and asked him to touch one of them, e.g., pictures of a knife, fork, and spoon were presented, and the child was asked to touch the fork. Full credit was given only when the child touched the correct picture first, and half credit only if he touched the correct picture second.

The vocabulary naming test was administered next. This test was composed of 15 items in which a single colored picture on a 6 x 3 1/2 in. laminated card was shown to the child. E asked the child, "What is this?" Examples of the items were a key, a policeman, and a zipper. Full credit was given only when the child responded accurately first. Half credit was given if, after an initial incorrect response, the child responded accurately or if any answer was close to accuracy, e.g., "coffee" or "broken" for a broken coffee cup, "man" for a policeman, "light" for a light socket. Maximum possible scores on the vocabulary recognition and naming tests were 22 and 15, respectively.

## Results

Social class was investigated by sex in relation to five performance variables from the four different tasks. The variables were total number of correct responses on each of the vocabulary tests, percentage of errors on the two-choice discrimination task, and mean number of errors and percentage of trials on which the child ever pointed to the correct figure on the EFT. The correlation matrices for these variables and social class is presented in Table 1.

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Insert Table 1 about here

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For girls, all of the variables were highly intercorrelated; for boys, only the two vocabulary scores were related.

## Discussion

The findings clearly support the hypothesis that parental education is related to performance on cognitive tasks among two-year-old girls but not among two-year-old boys. The stronger association between social class and cognitive performance for girls has two possible interpretations. Girls may be biologically more homogenous than boys due to girls' general developmental maturity relative to boys'. This general developmental maturity may aid in the modification of girls' responses by environmental contingencies, which would mean that differential experience in the world is more faithfully reflected in the behavior of girls. Thus, one might expect a more consistent relation in girls between specific experiences that are presumed to promote cognitive performance.

An alternative explanation, which is not inconsistent with the first, requires no biological assumptions. It assumes that social class has a stronger influence on the way mothers treat their daughters than on the way they treat their sons. Levine, Fishman, & Kagan (1967) provide evidence for this interpretation. These investigators found that upper middle-class mothers vocalized more in response to their four-month-old daughter's vocalizations than lower class mothers, but there were no social class differences between mothers of four-month-old boys.

Whatever the explanation, the results of the present study indicate that as early as 27 mo. of age, vocabulary level and other types of cognitive performance among girls are influenced by social class. These results, in conjunction with those of Honzik (1963) and Bayley (1966), strengthen the conviction that girls are more susceptible to environmental influence than boys and affected by it earlier.

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## Footnote

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Table 1

Product-Moment Correlation Coefficients Between Social Class and Measures of Cognitive Performance Among 27-Month-Old Children

| Variable | Vocabulary Recognition | Vocabulary naming | Percentage of accurate responses (EFT) | Mean number of errors (EFT) | Percentage of errors on 2-CDT |
|---|---|---|---|---|---|
| **Girls** | | | | | |
| Social class | .66** | .50* | .54** | -.36 | -.58** |
| Vocabulary recognition | -- | .68* | .56** | -.42 | -.71** |
| Vocabulary naming | -- | -- | .55** | -.52* | -.55** |
| Percentage of accurate responses (EFT)[a] | -- | -- | -- | -.74** | .64** |
| Mean number of errors (EFT) | -- | -- | -- | -- | .49* |
| Percentage of errors on 2-CDT[b] | -- | -- | -- | -- | -- |
| **Boys** | | | | | |
| Social class | .24 | .09 | -.16 | .32 | -.31 |
| Vocabulary recognition | -- | .74** | .29 | -.18 | .08 |
| Vocabulary naming | -- | -- | .20 | .07 | .32 |
| Percentage of accurate responses (EFT) | -- | -- | -- | -.22 | -.30 |
| Mean number of errors (EFT) | -- | -- | -- | -- | -.08 |
| Percentage of errors on 2-CDT | -- | -- | -- | -- | -- |

[a] Percentage of trials on which the child ever pointed to the correct figure on the embedded figures task.

[b] 2-CDT = Two-choice discrimination task.

* $p < .05$, two-tailed test.

** $p < .01$, two-tailed test.